Cymbopogon nardus Mediated Synthesis of Ag Nanoparticles for the Photocatalytic Degradation of 2,4-Dicholorophenoxyacetic Acid

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ABSTRACT

Advanced extraction method such as simultaneous ultrasonic–hydrodistillation (UAE–HD) extraction method has been proved to increased extraction yield of plant material yet the application of this method in the preparation of metal nanoparticles has not been studied. In this study, Cymbopogon nardus (C.N) extracted via UAE-HD extraction method was used to synthesis silver (Ag) nanoparticles. XRD and TEM analysis confirms the formation of spherical shape Ag nanoparticles with size ranging between 10-50 nm. FTIR spectra suggest the presence of bioactive compounds in the C.N leaves extract that may responsible to the stabilization and reduction of Ag ions (Ag^{+}) to metallic Ag nanoparticles (Ag^{0}). The TPC analysis successfully proved that huge number of phenolic compound greatly involved in the nanoparticles synthesis process. Next, the catalytic activity of the synthesized Ag nanoparticles was tested towards the degradation of 2,4-Dicholorophenoxyacetic acid herbicide with remarkable degradation performance up to 98%. Kinetic study confirms that surface reaction was the controlling step of the catalytic process.

KEYWORDS:

Silver Nanoparticles; Cymbopogon nardus; Ultrasonic-hydrodistillation; 2,4-D herbicide